Exemption No. 8007

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
RENTON, WASHINGTON 98055-4056

In the matter of the petition of **Dassault Aviation** for an exemption from § 25.785(b) of Title 14, Code of Federal Aviation Regulations	**Regulatory Docket No.** **FAA-2003-14423**

PARTIAL GRANT OF EXEMPTION

By letter dated January 17, 2003, Michel Aguado, Dassault Aviation, DGT-DTA/NAV, BP 24, Avenue M. Dassault, 33702 Merignac Cedex, France, petitioned for an exemption from § 25.785(b) of Title 14, Code of Federal Regulations (14 CFR). The proposed exemption, if granted, would permit relief from the general occupant protection requirements for multiple-place side-facing seats on Falcon 2000EX airplanes.

The petitioner requests relief from the following regulation:

Section 25.785(b) requires general occupant protection for occupants of multiple-place side-facing seats that are occupied during takeoff and landing.

The petitioner's supportive information is as follows:

"Dassault Aviation hereby petitions for a permanent exemption from the subject rules under FAR 25.785 (b) to enable installation of one or more side-facing sofas in the Falcon 2000EX model Aircraft.

"Dassault Aviation offers the attached information as support this action, along with reasons why action is in the public interest and with [sic] not adversely affect Safety.

"In particular, it is reminded that:

"- this exemption has been gained on basic Falcon 2000 (Exemption: 7104 / Issue Paper CI-1 closed at stage 4 on 05-Apr-01),

"- the Falcon 2000EX is a derivative model of the Falcon 2000, now fitted with more efficient Power Plant Systems and increased Fuel Quantity; this change does not affect the interior accommodation,

"- then, Sofa design defined by M0860 and associated substantiation has been found satisfactory for Falcon 2000EX by the JAA Certification Team without any additional compliance finding.

"Moreover, we respectfully submit that it is clearly in the public interest to grant the permanent exemption which is sought by this petition.

"As F2000EX s/n 2 (to be delivered N registered in April 2003) will be equipped with that sofa identical to those already installed on F2000 and approved under exemption 7104, it is Dassault Aviation's position that good cause exists to expedite the processing of this Petition in view of above reminders.

"Then, Dassault Aviation would like the FAA to waive the public comment period associated with an exemption that may adversely effect first delivery to our U.S. customer.

"As such, we respectfully request that, if granted, the Exemption be made effective no later than March 31, 2003."

"AIRPLANE MODEL AND CERTIFICATION BASIS

"- The Falcon 2000EX airplane is a twin-jet, swept-wing executive transport with a maximum take-off weight of 41,500 pounds and maximum landing weight of 39,300 pounds.

"- The US Certification Basis is Part 25 of the Federal Aviation Regulations effective February 1, 1965, as amended by Amendment 25-1 through Amendment 25-69 and through Amendment 92 [98] for parts affected by change from basic F2000 to F2000EX.

"- Certification type to the Joint Requirements of the Joint Aviation Authorities, in accordance with the provisions of JAR 25 including change 13 and change 14, will be granted by DGAC in March 2003. FAR Validation is expected by end of March 2003.

"STATEMENT OF ISSUE

"When amendment 25-64 was promulgated, side-side facing sofa installations were not adequately taken into account for Transport Category Airplanes.

"Amendment 25-64 revises the emergency landing conditions that must be considered in the design of the airplane:

"- revision of the static load conditions in paragraph 25.561,

"- addition of a new paragraph 25.562 that requires dynamic testing for all seats approved for occupancy during take-off and landing with a focus on forward-facing seats.

"As the existing regulations did not provide adequate safety standards for occupants of side-facing multiple occupant seats (sofas) and in accordance with the requirements issued in the Issue Paper in reference [1] [FAA Generic Issue Paper 'Dynamic Test Requirements for side-facing Divans,' Item C1-1, Stage 2, dtd 12-Nov-97], the certification method proposed by Dassault Aviation for this type of seating was by means of an exemption from the general injury criteria established in FAR 25.785.

"This exemption has been granted on basic Falcon 2000 on Issue Paper CI-I 'Finding Compliance with Exemption n° 7104' closed at stage 4 on 04-April-2001.

"It is proposed to extend this exemption to its derivative model F2000EX.

"PETITION

"As for basic F2000, Falcon 2000EX aircraft model will be most often utilized for executive air transportation under Parts 91 and 135 of the Federal Aviation Regulations.

"Due to the nature of the transportation involved, some customers request at least one side-facing sofa when limited to operation under FAR Parts 91 and 135.

"Under 14 CFR Part 11.25, Dassault Aviation requests exemption from the following applicable rules:

"- FAR 25.785 (b) Amdt 25-88 for side-facing sofas

"Justifications already provided and accepted for the basic Falcon 2000 are presented herein and statement on interior accommodation of both models is produced.

"JUSTIFICATION AND SAFETY CONSIDERATIONS

"Prior to Amendment 25-64, side-facing seats were not considered a novel design for transport category airplanes. They were routinely approved for installation in compliance with paragraph FAR 25.561 and commonly installed on Fan Jet Falcon Series, Mystere Falcon 50, Mystere Falcon 900 and Falcon 900EX airplanes as well as aircraft models produced by other manufacturers.

"Amendment 25-64 included paragraph 25.562, which provides a means of enhancing occupant protection under more realistic conditions than had previously existed in terms of both test conditions and pass/fail criteria. For multiple occupant side-facing sofas, the FAA has taken the position that these criteria do not provide an equivalent level of safety.

"However, with respect to the Falcon 2000 side-facing Sofa JAA certification, a series of dynamic tests have been performed at 'Centre d'essai Aeronautique de Toulouse' (CEAT -14g test) and at Civil Aero Medical Institute in Oklahoma City (CAMI- 16 g tests). These tests have demonstrated that the DASSAULT sofa design complies with the injury criteria proposed in the above referenced FAA draft Issue Paper."

"Safety Considerations

"The results of these Falcon dynamic tests are:

"(a) Existing Criteria:

The requirements of paragraphs 25.562(c)(1) to (4) and (6) are met.

"(b) Body to body contact:

There is no contact between adjacent occupants.

"(c) Body to wall/furnishing contact:

"Two installation configurations are possible:

- There is no partition with or without furniture forward on the sofa. The tests have shown that there is no contact, body or head, with any aircraft interior installation.
- Installation of a partition, within the trajectory of the head of the forward most passenger.

"We propose to evaluate the HIC, according to paragraph 25.562(c)(5), by a test representative of the second configuration, using an Hybrid III dummy [see General Guidelines for Testing, paragraph (c)(1)].

"(d) Thoracic trauma:

"The armrests are relatively low and do not have any significant impact on the thorax. The TTI derived from the test measurements remains well below the value defined in 49 CFR part 571.214.

"(e) Pelvic:

"The pelvic lateral acceleration remains well below 130 g.

"(f) Shoulder Strap Loads:

"The upper torso restraint strap remains on the occupant's shoulder, and the tension load in this individual strap does not exceed 1750 lb.

"General Guidelines for Testing

"The general guidelines contained in the draft issue paper have been applied during the Falcon 2000 dynamic tests.

"(a) All side-facing seats require end closures:

"The sofa was equipped with armrests at each end limiting each individual seat position.

"(b) All seat positions need to be occupied for longitudinal tests:

"All 3 seat positions were occupied.

"(c)(1) One test will be required with one SID in the forward most position and Hybrid II ATD(s) in all other positions, with undeformed floor, no yaw, and with all lateral supports (armrests/walls):

"Two longitudinal tests without floor deformation were performed:

"- One with 10 degrees yaw, with limiting armrests and with a Hybrid III ATD in the forward position, a SID in position 2 and a Hybrid II in position 3.

"- One without yaw, with limiting armrests, furniture and wall forward the sofa, and with a SID in the forward position, a Hybrid II ATD in position 2 and a Hybrid III ATD in position 3.

"The selection of different Anthropomorphic test dummies in different locations, with or without yaw, was made in order to obtain the maximum amount of information on human injury parameters during side impacts.

"The test analysis shows clearly that the use of a SID is inappropriate for Falcon 2000 business jet sofas [see Rationale for the use of a Hybrid III dummy, below]

"(c)(2) One test will be required with one SID in the center seat and Hybrid II ATD(s) in all the other positions, with deformed floor, 10 degrees yaw, and with

all lateral supports (armrests/walls). This could be considered the structural test as well:

"One longitudinal test with floor deformation and 10 degrees yaw, with armrests, was performed with a Hybrid III ATD installed in the forward most position and two Hybrid II ATD(s) in position 2 and 3.

"The installation of one SID in the center seat is documented in paragraph [(c)(1) above].

"(d) For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATD's will be used in all seat positions:

"A vertical test was conducted at the CEAT with 3 Hybrid II ATDs.

"Rationale for the use of a Hybrid III dummy:

"The Side Impact Dummy (SID) is inappropriate for Falcon 2000 side-facing sofa longitudinal tests, because it does not include any shoulder frame. In a side impact involving an automobile, the restraint of the passenger and the action of the shoulder harness are not considered. When considering Falcon 2000 sofas, the location of the attachment of the shoulder harness i.e. inertia reel, is well below the shoulder level. The restraint of the upper torso and of the head, in the dummy's lateral direction, is only possible if it is combined with a compression load in the spine. That compression is introduced by the harness in the shoulder structure. The test performed at the CAM1 In July, 98 shows clearly that the SID does not react to any load on the shoulder. Therefore, to evaluate the HIC, we propose to use a Hybrid III dummy presenting the same neck and head structure as the SID (same dynamic behavior) and having the ability to react to shoulder loads.

"In conclusion, DASSAULT AVIATION hereby proposes that for Falcon 2000 business jet sofas the SID be replaced by a Hybrid III dummy.

"FALCON 2000EX INTERIOR ACCOMMODATION

"As a reminder, Falcon 2000EX is a derivative model of the Basic Falcon 2000 by installation of new Power Plant system and with increased Fuel Quantity.

"The interior accommodation is not affected by this change and then, the above justification remains valid for the Falcon 2000EX:

"- interior accommodation identical for both Falcon models,

"- and identical Sofa design.

"PUBLIC INTEREST

"The importance of business aviation to the well-being of the U.S. economy can not be overstated. Business aviation enables a company to maximize its two most important assets: people and time. [For] example, business aircraft reduce not only flight time but also total travel time by providing point to point service and by their ability to utilize smaller airports closer to final destinations. In addition, the 'office' environment which exists within the business aircraft allows travel time of by [sic] executives and their guests, to become productive time.

"Very often, conversations conducted on business aircraft are confidential and deal with commercially sensitive matters. Accordingly, owners of business aircraft strongly prefer to configure their cabins in such a way that special requirements of their operation can be met. One of the most popular configurations requested by a wide array of business and public sector customers is a split cabin configuration where one sector is devoted to club seating used for individual work areas and dining areas while the second sector is devoted to private meetings and/or a rest area set off from the remainder of the cabin.

"Over the years, it has been determined that the most efficient means to configure the private meeting/rest area is to install a side-facing multi seat divan (sofa) which serves the dual purpose of providing seating for private meetings and which has the capability to be converted to a comfortable rest area during the course of the flight. Moreover, it has also been established that this configuration, provides the best possible seating arrangement for physically handicapped and/or ill passengers who require the ability to lay in a semi or full supine position during portions of the flight in order to maintain an acceptable level of comfort. Finally, this configuration also allows augmented flight crews to rest during the course of long haul flights in an area which is separated from the remainder of the cabin and which permits other passengers to continue their work undisturbed. The importance of having such a suitable rest area for augmented crews has been highlighted by such notable organizations as the Flight Safety Foundation and the FAA in order to ensure that the highest level of safety is maintained during long haul and/or multiple leg flights.

"The granting of this exemption will permit the most efficient use of the aircraft cabin for business meetings and other commercial activities which will significantly enhance the value of the aircraft to its owner/operator. Further, the granting of the petition will allow better and more comfortable rest area accommodations for busy executives and physically challenged passengers as well as crewmembers who require rest in order to perform their flight duties in a safe and alert manner."

Notice and Public Procedure

The petitioner has requested that a decision on their petition for exemption not be delayed by publication in the Federal Register and a public comment period. In

accordance with 14 CFR 11.87, the FAA finds that action on this petition need not be delayed by Federal Register publication and comment procedures for the following reasons: (1) the notice and opportunity for prior public comment are impracticable because those procedures would significantly delay issuance of the design approval and delivery of the affected airplane; and (2) issuance of the exemption would not set a precedent.

The Federal Aviation Administration's analysis/summary is as follows:

The applicant's petition for exemption from § 25.785(b) is based on the FAA memorandum "Side-Facing Seats on Transport Category Airplanes," dated November 19, 1997. This memorandum and its attached issue paper provide dynamic test conditions and pass/fail criteria for side-facing seats on transport category airplanes.

(1) The dynamic test conditions criteria. In terms of both pulse severity and types of tests currently required, the criteria in § 25.562 are also considered directly applicable to side-facing seats. While it is true that the regulation was written with forward- and aft-facing seats in mind, the orientation of the seat does not change the relevant test conditions.

(2) The pass/fail criteria. For these criteria, however, the orientation of the seat may be significant. Injury criteria are currently limited to head, spine, and femur loads. Head impact is evaluated for contact experienced by the head against any aircraft interior installations, and the pass/fail criterion is based on the resultant head acceleration considering all axes of head motion. The lumbar spinal load is an axially compressive load that is primarily evaluated during the 14g, 60-degree test. The femur load is also compressive, and actually has not proved to be critical thus far. For a side-facing seat, other injury parameters may predominate such that evaluation of those parameters may be necessary to provide an acceptable level of safety.

The first consideration for a side-facing seat is the isolation of one occupant from another. That is, occupants should not rely on the impact with other occupants to provide energy absorption; body-to-body impacts are considered unacceptable.

The second consideration for a side-facing seat is the retention of occupants in the seat and restraint system. Addressing this concern may necessitate providing a means of restraint for the lower limbs as well as the torso. Failure to limit the forward (in the airplane's coordinate system) travel of the lower limbs can cause the occupant to come out of the restraint system or produce severe injuries due to the resulting position of the restraint system, and/or twisting (torsional load) of the lower lumbar spinal column.

The third consideration for a side-facing seat is limiting the load exerted on the torso in the lateral direction, where human tolerance differs from that for the forward- or aft-facing directions and where potential injury mechanisms exist. The automotive industry has developed test procedures and occupant injury criteria appropriate for side impact conditions. Their criteria involve limitation of lateral pelvic accelerations and use of the human tolerance parameter "Thoracic Trauma Index," which is defined in 49 CFR 571.214. Use of the 49 CFR 572, subpart F, Side Impact Dummy (SID), rather than the 49 CFR 572, subpart B, Hybrid II Dummy used in the 14 CFR 25.562 test, is required to evaluate these parameters. This is the best means available, at present, to assess the injury potential of a sideward impact condition. Such an evaluation is considered necessary to provide an acceptable level of safety for these types of seats.

Other potential injury mechanisms appropriate for aircraft seats may exist. However, due to the lack of useful injury criteria for those other potential injury parameters, such as neck loads and lower limb flail, the FAA is not able to specify criteria applicable to those areas at this time. The FAA considers that such criteria may be appropriate, particularly for multiple occupancy installations, and intends to pursue their further development.

For multiple occupancy seating, the best criteria currently available cannot be said to provide an equivalent level of safety for those occupants. Therefore, the only vehicle available for accepting these installations would be through an exemption from the general occupant protection requirements of § 25.785(a) prior to Amendment 25-72, or § 25.785(b) after Amendment 25-72.

The following summary of the criteria from the FAA draft issue paper "Dynamic Test Requirements for Side-Facing Divans (Sofas)," dated November 12, 1997 (an attachment to FAA memorandum "Side Facing Seats on Transport Category Airplanes," dated November 19, 1997), provides the basis of the petition for exemption.

1. Proposed Injury Criteria

(a) Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupants of side-facing seating. Head injury criteria (HIC) assessments are only required for head contact with the seat and/or adjacent structures.

(b) Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of one seated Anthropomorphic Test Dummy (ATD) and the adjacent seated ATDs is not allowed to occur during the test conducted in accordance with § 25.562(b)(1) and (b)(2). Incidental contact of the legs, feet, arms, and hands that will not result in incapacitation of the occupants is acceptable. Contact during rebound is allowed.

(c) Body-to-Wall/Furnishing Contact: If the sofa is installed aft of a structure such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, then a conservative representation of the structure and its stiffness must be included in the tests. The contact surface of this structure must be covered with at least two inches of energy-absorbing protective foam, such as Ensolite.

(d) Thoracic Trauma: Testing with a Side Impact Dummy (SID), as defined by 49 CFR part 572, subpart F, or its equivalent, must be conducted and Thoracic Trauma Index (TTI) injury criteria measurement acquired with the SID must be less than 85, as defined in 49 CFR part 572, subpart F. Side impact dummy TTI data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.

(e) Pelvis: Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, section S6.13.5.

(f) Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.

2. General Guidelines

(a) All side-facing seats require end closures.

(b) All seat positions need to be occupied for the longitudinal tests.

(c) For the longitudinal tests, conducted in accordance with the conditions specified in § 25.562(b)(2), a minimum number of tests will be required as follows:

(1) One test will be required with one SID ATD in the forward most position and Hybrid II ATD(s) in all other positions, with undeformed floor, no yaw, and with all lateral supports (armrests/walls).

(2) One test will be required with one SID ATD in the center seat and Hybrid II ATD(s) in all other positions, with deformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). This could be considered the structural test as well.

(d) For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATDs will be used in all seat positions.

The petitioner has requested that Exemption No. 7104 for Falcon 2000 airplanes be extended to Falcon 2000EX airplanes and that the exemption be granted without a time limitation. However, the petition is not consistent in that it is a slightly modified re-submittal of the Falcon 2000 petition, which does not address differences between the limitations proposed and those actually required in Exemption No. 7104. The petitioner has been contacted and has confirmed that their request is for an exemption with the same limitations of Exemption No. 7104. Additionally, the petitioner indicated that an exemption with the same time limitation of Exemption No. 7104 would be acceptable at this time, and that they would submit another petition at a later date to address airplanes manufactured after the expiration date.

The FAA concurs that the limitations in Exemption No. 7104 are acceptable for Falcon 2000EX airplanes. Concerning the time limitation, the FAA may refine the compliance criteria for multiple-occupancy side-facing seating to establish an equivalent level of safety. As a result, the FAA will grant an exemption that will cover only airplanes that are manufactured for a specific amount of time. For the purposes of this exemption, the "date of manufacture" is the date on which inspection records show that an airplane is in a condition for safe flight. This is not necessarily the date on which the airplane is in conformity with the approved type design, or the date on which a certificate of airworthiness is issued. It could be earlier, but would be no later, than the date on which the first flight of the airplane occurs.

In consideration of the foregoing, I find that a partial grant of exemption is in the public interest and will not affect the level of safety provided by the regulations. Therefore, pursuant to the authority contained in 49 U.S.C. 40113 and 44701, delegated to me by the Administrator, Dassault Aviation is granted a partial exemption from the general occupant protection requirements of § 25.785(b) for multiple-place side-facing seats occupied during takeoff and landing on Dassault Aviation Falcon 2000EX airplanes manufactured prior to January 1, 2004. This partial exemption is subject to the following limitations.

1. Existing Criteria: All injury protection criteria of § 25.562(c)(1) through (c)(6) apply to the occupants of side-facing seating. The HIC assessments are only required for head contact with the seat and/or adjacent structures.

2. Body-to-Body Contact: Contact between the head, pelvis, or shoulder area of one Anthropomorphic Test Dummy (ATD) with the adjacent seated ATDs is not allowed during the tests conducted in accordance with

§ 25.562(b)(1) and (b)(2). Any contact between adjacent ATDs is acceptable during rebound.

3. Body-to-Wall/Furnishing Contact: If the sofa is installed aft of a structure such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, then a conservative representation of the structure and its stiffness must be included in the tests. In most cases, the representation of the structure would be more rigid and have less deflection under load than the actual installation on the airplanes. The contact surface of this structure must be covered with at least two inches of energy-absorbing protective foam, such as Ensolite.

4. Thoracic Trauma: Thoracic Trauma Index (TTI) injury criteria must be less than 85, as defined in 49 CFR part 572, subpart F. Thoracic trauma index data must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) part 571.214, section S6.13.5.

5. Pelvis: Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS part 571.214, section S6.13.5.

6. Shoulder Strap Loads: Where upper torso straps (shoulder straps) are used for sofa occupants, the tension loads in individual straps must not exceed 1,750 pounds. If dual straps are used for restraining the upper torso, the total strap tension loads must not exceed 2,000 pounds.

7. Seat Positions: All seat positions need to be occupied by ATDs for the longitudinal tests.

8. Occupant Retention: All side-facing seats require end closures or other means to prevent the occupant from moving laterally off the end of the seat.

9. Longitudinal Tests: For the longitudinal tests conducted in accordance with the conditions specified in § 25.562(b)(2), a minimum number of tests will be required as follows:

    a. One test will be required with ATDs in all positions, with undeformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). For configurations with a wall or bulkhead immediately forward of the forward seat position on the sofa, a SID ATD will be used in the forward seat position and a Hybrid II ATD(s) or equivalent will be used for all other seat locations. For configurations without a wall or bulkhead immediately forward of the forward seat, Hybrid II ATDs or equivalent will be used in all seat locations.

b. One test will be required with Hybrid II ATDs or equivalent in all positions, with deformed floor, 10 degrees yaw, and with all lateral supports (armrests/walls). This could be considered the structural test as well.

10. Vertical Test: For the vertical test, conducted in accordance with the conditions specified in § 25.562(b)(1), Hybrid II ATDs or equivalent will be used in all seat positions.

Issued in Renton Washington, on March 31, 2003.

/s/ K.C. Yanamura
Acting Manager
Transport Airplane Directorate
Aircraft Certification Service